

IN THE DRAWINGS:

Figures 11A and 11B have been amended herein to include the legend "Prior Art". A Replacement Sheet, as well as an Annotated Sheet, are attached hereto, showing these amendments.

REMARKS

Claims 1, 3, 6, and 7 have been cancelled, and claims 2, 4 and 5 have been amended to more definitely set forth the invention and obviate the rejections. Support for the amendment of claims 2, 4 and 5 can be found in the Specification from page 11, line 6, to page 12, line 11, page 13, lines 8-23, Figure 3. The present amendment is deemed not to introduce new matter. Claims 2, 4 and 5 remain in the application.

Reconsideration is respectfully requested of the objection to Figures 11A and 11B. In accordance with the Examiner's requirement, a Replacement Sheet and an Annotated Sheet for Figures 11A and 11B are provided herewith, in which the legend "Prior Art" has been added to both of the above-mentioned figures. In view of these amendments to Figures 11A and 11B, it is believed that the rejection is now moot. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1-7 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2, 4 and 5 have been rewritten herein to address and overcome the issues identified by the Examiner in paragraph 4, on pages 3 and 4, of the instant Office Action. In particular, the objectionable terms "cantilever" and "metal molds" have been deleted from the claims. Furthermore, the claims have been rewritten to now provide antecedent support for all claimed

elements.

In view of the amendments made herein, it is believed that the rejection is now moot. Withdrawal of the rejection is accordingly respectfully requested.

Reconsideration is respectfully requested of the rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent Document 2000-94488 in view of any one of Ueno (USP 4,984,980), Inaba, et al. (USP 6,179,607), Ziv-Av (USP 6,186,770), and Wohlrab (USP 6,851,942).

JP 2000-94488 (hereinafter referred to as the “488 reference”), the primary reference cited herein, is owned by Daiwa Kasei Industry Co., Inc., the assignee herein. The ‘488 reference discloses a straight-hydraulic type motorized injection molding device, wherein ball screws are utilized to move a movable plate 13. Further, an injection side movable plate 33 is provided, which is moved by ball screws 36 and 37, and to which an injection plunger 42 is attached via tie bars 35 and 36.

As the Examiner has correctly noted on page 5 of the instant Office Action, the cited ‘488 reference fails to disclose that the two ball screws provided for opening and closing the mold are unsupported at the end opposite the center fixed plate. Further, as the Examiner has recognized, the ‘488 reference fails to disclose a slide guide for receiving a lower portion of the movable mold plate, as claimed herein.

To cure the deficiencies of the cited ‘488 reference mentioned above, the Examiner has cited four secondary references, each of said secondary references discussed below as follows:

The Ueno reference discloses a mold clamping apparatus for die casting or injection

molding. However, the Ueno device includes “a plurality of tie bars arranged parallel to the rails and cantilevered by the stationary platen, and a ball screw device mounted on each of the tie bars, the tie bars being arranged to extend through the movable platen” (column 2, lines 63-67). Further, it is stated that “the movable platen is moved on the tie bars by an action of the ball screws to perform mold closing” (column 3, lines 4-6). “One end of each of tie bars 10 extending through the total length of the machine is inserted in a corresponding one of tie bar holes formed at four corners of the stationary platen” (column 4, lines 3-6). Thus, in contrast to the present invention, the Ueno device requires four tie bars to support both the stationary and movable platen, and move the movable platen (which correlates to the claimed movable mold plate herein).

The cited secondary reference of Inaba, et al. discloses a two-platen mold-clamping apparatus. As shown in Figure 1, “the mold-clamping apparatus is further provided with four elongated ball screws 40 each of which extends in parallelism to the frame 10 and passes through a nozzle hole 21 which is formed in the stationary platen 20” (column 2, lines 35-40). These four ball screws 40 extend through and support the movable platen 30 via the ball nuts 50. As in the Ueno reference discussed above, the Inaba, et al. device requires the movable platen to be supported by four ball screws, and fails to disclose a slide guide having two grooves therein for support of the movable platen, as claimed herein.

The cited secondary reference of Ziv-Av discloses a clamping assembly for injection molding. As with the Ueno and Inaba, et al. devices, and unlike the present invention, the Ziv-Av device relies upon four tie bars 18, as shown in Figure 1, 2 and 9-12, to support the movable platen 16. Further, no slide guide, in which the movable mold plate is guided within same during the

molding process, is taught or suggested by the Ziv-Av disclosure.

The cited secondary Wohlrab reference discloses a platen clamping unit for an injection molding machine. As with all of the above-mentioned secondary references, and unlike the present invention, the Wohlrab device utilizes four threaded spindles 14, 15, which protrude through and support the moving mold mounting plate 3 at one end of the spindle (see column 2, lines 1-5, and Fig. 1). The spindles 14, 15, are supported at the opposing ends thereof by the fixed mold mounting plate 16. Further, as with the other secondary references discussed above, the Wohlrab reference fails to disclose a slide guide having an upper and lower groove for support and guidance of the movable mold plate, as now claimed herein. Moreover, unlike the present invention, the spindles act as “piston rods for carrying the pistons 9 of a hydraulic piston and cylinder unit, whereby the pistons are guided in cylinders formed in the mold mounting plate” (column 3, lines 32-35).

In contrast to the four secondary references discussed above, as stated on page 13, lines 8-23, of the Specification, the movable mold plate 13 does not have a tie bar (guide bar) to guide same, and does not need guided portions for the tie bars, such as through- holes. Thus, a lighter and smaller movable mold plate 13 can be utilized. Specifically, the movable mold plate of the present invention is penetrated by only two ball screws at two opposing corners thereof which, along with the slide guide, satisfactorily guide the movable mold plate during the injection molding process. The other two corners of the movable mold plate do not require form through-holes, as they are not supported or penetrated by ball screws. Therefore, the movable mold plate of the present invention has a compact shape, as two corner portions may be deleted from the movable mold plate.

In other words, the upper portion of the diagonal part diagonally penetrated by the two ball

screws, as shown in Fig. 13, has a projection (as now claimed in claim 2 herein) formed upward from the upper edge of the movable plate 13, the ball screw 17 penetrating this projection. In comparison to ordinary square movable mold plates, the movable mold plate of the present invention is considerably more compact, thus contributing to light weight and small size of the apparatus of the present invention.

Because of omission of tie bars guiding the movable plate, the movable plate does not require end plates supporting tie bar ends. As shown in Fig. 3, the movable mold plate 13 has ball screws 17 and 18 protruding therethrough. However, because of the omission of end plates supporting end portions of the ball screws, the ball screws can be supported only at one end and in the middle only. Therefore, an extremely simple and compact motor-driven injection molding apparatus is provided by the present invention by abolishing endplates and tie bars. Furthermore the mold plate has a compact shape having a projected portion penetrated through by one of the two ball screws, so as to move around and go through obstacles in surroundings without any interference.

Importantly, instead of tie bars, as used in conventional apparatuses, the apparatus of the present invention has a structure, as now claimed in amended claim 2 herein, comprised of a slide guide having an upper ball groove and a lower ball groove to support the movable mold plate 13. In particular, bearing units are affixed to the lower portion of the movable mold plate, and ball bearings contained within the bearing units rest and slide within the upper and lower ball grooves. By providing two parallel ball grooves (upper and lower) on the linear rails of the slide guide, the load (mass) of the movable mold plate, as well as the movable mold, is stably supported by the

linear rails via the upper and lower ball grooves and the ball bearings, while allowing the movable mold plate to be guided smoothly along the linear rails.

The primary '488 reference discloses only a square movable mold plate with two ball screws, two tie bars and no slide guides, and the four secondary references ('944, '980, '770 and '607) disclose only a square movable mold plate with four ball screws and slide guides. It is believed that a combination of any of the above references fails to disclose a movable mold plate having a projected portion, penetrated through by one of the two ball screws, on the upper edge thereof and the slide guides guiding thereof, as described in now amended claim 2 herein.

Consequently, it is believed that none of the cited reference, either alone or in combination, teach or suggest the motor-driven injection molding apparatus as now claimed herein. In view of the deficiencies of the cited references, as pointed out above, and the amendments made to the claims herein, it is believed that the combination of cited references fails to render unpatentable the claims as presently in the application. Withdrawal of the rejection is accordingly respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is now in condition for allowance, and early action and allowance thereof is accordingly respectfully requested. In the event there is any reason why the application cannot be allowed at the present time, it is respectfully requested that the Examiner contact the undersigned at the number listed below to resolve any problems.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this Amendment in Docket No. SUG-020-USA-P, Serial No. 10/677,319, filed October 3, 2003, is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

Mail Stop Amendment
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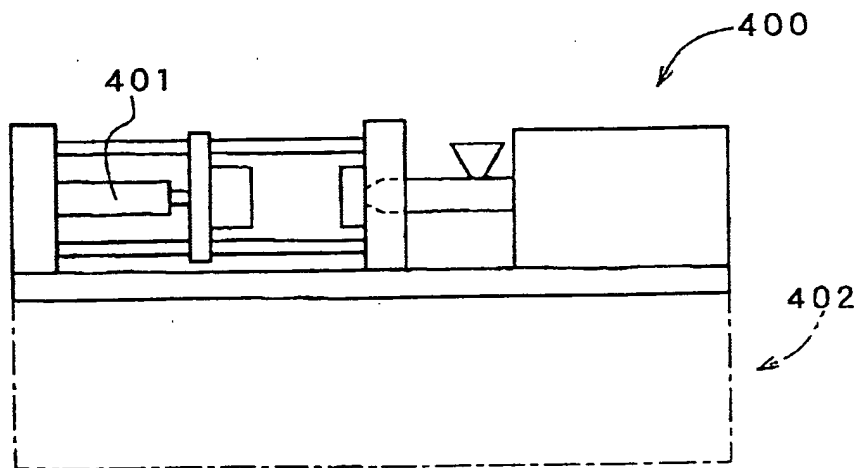
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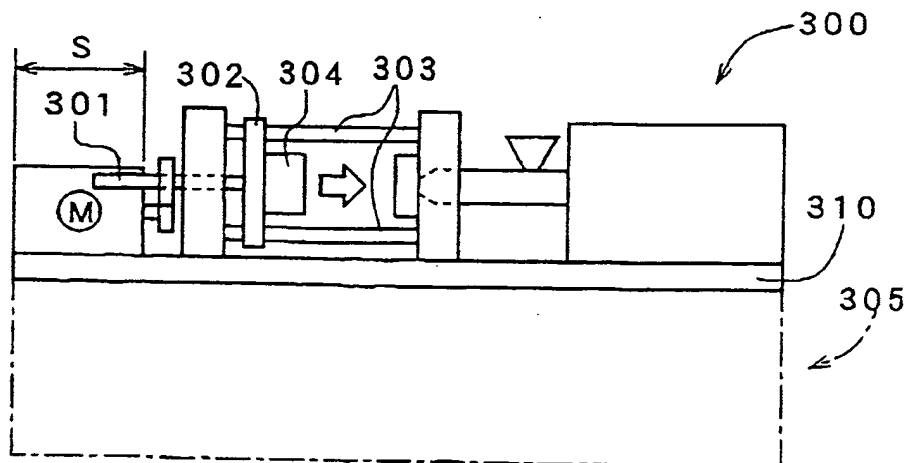
FIG.11A



PRIOR ART

Newly added

FIG.11B



PRIOR ART

Newly added